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APR 0 1 1972

MILFORD RIVET & MACHINE CO.
PLATING ROOM WASTES

EXISTING SYSTEM

The waste waters from the Plating Room consist of running overflows from two Cyanide-bearing rinse tanks and one Acid-bearing rinse tank. These are combined in a sump in the plating room with waste from tumbling barrels which contains a non-toxic cleaning agent.

All the plating rinses, and the discharge from the tumbling barrels on the East side of the plant are combined in a sump and flow to the Wet Well in the Waste Treatment plant, from which they are pumped automatically to one of the four lagoons.

The drains from the tumbling barrels on the West side of the Plating Room flow by gravity to two "Skimming Tanks", designed for removal of oil from the waste, which is presently negligible in quantity. When these tanks are full the operator manually operates valves and pumps this waste to one of the lagoons.

Each day the untreated waste from lagoons is pumped to the four mixing and treatment tanks in the Waste Treatment building, where hypochlorite and sulfuric acid are added to regulate the pH of the mixed solution. After approximately three hours, the pH is checked, and if satisfactory the waste is dumped by gravity to the sewer. At times the pH is not considered satisfactory and the waste is returned to a lagoon for reprocessing on another day.

While no actual determination of flow rates or quantities has been made, it is estimated that since the volume of the four tanks is approximately 5500 gallons and the above operation is normally done once a day, the daily volume over a 16 hour work day is approximately 22,000 gallons. This represents an average flow of 1375 gallons per hour, of which the rinse tanks contribute about 5 gpm each for 900 gph, the balance being waste from tumbling barrels and miscellaneous at 475 gph. Since half the tumbling barrels combine with rinse waters, about 1150 gph enters the wet well and is automatically pumped to a lagoon, while about 225 gph accumulates in the skimming tanks, which at this rate have a capacity suitable for about 8 hours retention.

It is reported that the State has requested that under the present method of operation, involving storage of untreated waste in the lagoons, the lagoons shall be made watertight and additional freeboard provided. ~~It is believed that if the lagoons were utilized only for storage of treated waste and drying of non-toxic sludge, no such requirement would apply.~~

In my opinion, it is very hazardous to add acid to the Cyanide-bearing waste as is presently done, both by combining the two types of rinse waters in the plating room, and in the Waste Treatment building. Under certain conditions of concentrations, this can produce a very deadly gas, and is normally prohibited.

RECOMMENDATIONS

It is recommended that the waste treatment system be converted to an automatic, continuous system, as follows:

1. Divert the acid-bearing rinse water into a separate sump, and pump this waste directly to the pH adjustment tank.

2. Provide a new package type CN waste treatment unit, which will automatically feed sodium hypochlorite and if necessary sodium hydroxide to maintain a pH of approximately 11.0 At this condition the Cyanide content is converted to Cyanates.

3. By means of existing piping direct the flow of Plating Room CN waste to the CN treatment unit. Replace present discharge slide gate with a gate valve for shut-off if necessary.

4. The Cyanate-bearing effluent from the waste treatment unit will flow by gravity to the first existing "mixing and treatment tank", which has been designated "CN Reaction". In this tank controlled addition of hydrochloric acid takes place to reduce the pH to 8.0. In about one-half hour of reaction time the cyanate breaks down into nitorgen gas and sodium carbonate. The treated solution flows to the next tank, which has been designated "CN Retention", to insure completeness of reaction. From this tank the liquid flows continuously to the next tank, designated "pH Adjustment".

5. When tumbling barrel waste has accumulated in the "Skimming Tanks", approximately once per day, the operator will pump this liquid into the pH Adjustment tank through existing piping and valves. There is then a mixture in this tank of treated waste from the cyanide system, untreated acid-bearing waste, and untreated (caustic) tumbling barrel waste, some of which is flowing continuously. A pH controller will monitor the quality of the contents of this tank, and will add acid or caustic as required to adjust the pH.

6. From the pH Adjustment tank the treated effluent will flow to the fourth chamber, designated "Settling", where it is anticipated that any solids in suspension will settle out, and finally through a collection chamber to the sewer.

7. If required by the Sewer Authority a Redox or O-R-P- recorder will be installed to monitor the quality of the final effluent and detect the possible presence of Cyanide.

8. The existing sludge drains and sludge pump will be used to pump any accumulation of sludge periodically to a tank truck for disposal.

9. If it is found that under the proposed method of sludge handling there is a carryover of solids to the sewer, a feed system for flocculator will be installed in the settling chamber, and if it is found that the sludge accumulation in the sludge chamber becomes voluminous, an outside sludge holding tank will be added to the system.

ADVANTAGES

It is believed that the proposed changes to the Waste Treatment System will result in the following advantages to the Owner:

1. Discontinuance of the present lagoons will remove the waste treatment system from State control, which will obviate the necessity of compliance with the work indicated in the Violation Notice from the State and the necessity of applying for a State permit to retain the lagoons.

2. Installation of an automatic system will free the operator from substantially full-time duty, since only minimal attention will be required.

3. The potential hazardous condition of mixing acid and cyanide-bearing wastes will be eliminated.

4. Quality of the effluent to the Sewer, and eventually to the Upper Moreland-Hatboro Joint Sewer Authority treatment plant will be more uniform and more predictable than under present method of operation.

Andrew F. McLure, Jr. }
George I. Gillette } B.E.

MILFORD RIVET & MACHINE CO.
HATBORO, PA.

GENERAL

1. The plant produces hardware items, specifically rivets, formed of steel, aluminum, copper, and brass basis metals by automatic machinery. The formed product is then treated by solvent degreasing, followed by cleaning in tumbling barrels with a mildly acid compound, after which it is rinsed, and electro-plated with copper, nickel, zinc, cadmium, or brass.

2. The waste waters from the cleaning and treatment processes are pre-treated in an in-plant industrial waste system, and discharged in conjunction with sanitary wastes from the plant to a sanitary sewer leading to the sewage treatment plant operated by the Upper Moreland-Hatboro Joint Sewer Authority.

EXISTING INDUSTRIAL WASTE SYSTEM

1. Waste waters from the Plating Room, consisting of running overflows from two Cyanide-bearing rinse tanks and one Acid-bearing rinse tank, and acid waste from the tumbling barrels and their manual rinses, flow to the waste treatment plant by gravity, and are automatically pumped to one of the four earth lagoons.

2. Each day the untreated waste from one of the lagoons is pumped to the four mixing and treatment tandk in the Waste Treatment building, where sodium hypochlorite and sulfuric acid are added to regulate the pH and reduce the Cyanide content of the mixed waste. After approximately three hours, the pH is checked by color comparison of a sample with a colorimeter, and if satisfactory the waste is dumped by gravity to the sewer. If the operator determines that the color match is not satisfactory, the waste is returned to a lagoon and again treated on another day. Periodic samples are also checked by Betz Laboratories and analyzed to insure that the final effluent is acceptable to the Sewer Authority.

3. While no actual determination of flow rates or quantities has been made, since the capacity of the four mixing tanks is 5,500 gallons each, the daily volume over a 16 hour period is approximately 20,000 gallons.

4. From a paper written by Mr. M.U. Priester, original designer of the plant, it appears that the lagoons were originally designed for sludge settling, and not for storage of untreated waste. Also, at that time, it was reported that each of the 5,500 gallon tanks was of sufficient capacity for storage and treatment resulting from production on one 8 hour shift.

5. Plant operation is currently on a 16 hour basis, and the tumbling barrels on the East side of the Plating Room have been added since the plant's inception, so that the volume of waste substantially exceeds the original quantity.

6. A very hazardous condition exists in that Cyanide and Acid-bearing rinse waters are mixed in the Plating Room, and that Sulfuric Acid is added to the mixed waste in the Waste Treatment building with no control. Under certain conditions of concentrations which could result from a floor spill or tank leakage, a very toxic gas would result from this mixture.

RECOMMENDATIONS (SCHEME "B")

1. Reduce the volume of rinse waters by the addition of conductivity controls on the three rinse tanks. The total of rinse water and cleaning waste waters should then not exceed the capacity of one 5,500 gallon tank per 8 hour shift. This will eliminate the usage of the lagoons for storage of untreated waste, but will require that batch type treatment be done twice during a 16 hour period of operation.

2. Pipe overflow from the acid rinse tank to combine with waste from the tumbling barrels on the West side of the Plating Room, which flows to the two "skimming tanks". These tanks were originally designed for oil removal,

which since installation of the degreaser is no longer a problem. This will eliminate the hazard of mixing acid and Cyanide at this phase of the treatment. The tanks are sufficiently large to retain an accumulation resulting from at least 8 hours operation.

3. Overflows from Cyanide rinse tanks and waste from tumbling barrels on the East side of the Plating Room will continue to flow to the Wet Well, from which the waste waters will be pumped automatically to one of the four 5,500 gallon Storage & Treatment tanks. By reducing the volume of rinse waters as above, one of these tanks will amply hold an 8 hour accumulation, and it is proposed that Tanks #1 and #2 be used alternately for this purpose.

4. The third 5,500 gallon tank, designated as #3, will be used for pH adjustment, while #4 will be used for settling of solids before discharge to the sewer via a final settling in the "Uniform Discharge Chamber".

5. The waste in Tank #1 or #2 will contain tumbling barrel waste and Cyanide residuals from the plating operations, and the pH will be in the upper range normally. Add sodium hypochlorite, and acid or caustic if necessary, in sufficient quantity to produce a pH of not less than 11.0 and a stable chlorine residual of approximately 15 ppm. Agitate for at least 15 minutes, then add sulfuric acid to reduce the pH to 8.5, at which point the cyanates formed in the previous operation will be further reduced. After at least 30 minutes retention time, check to insure completeness of the reaction, and transfer the treated waste to the pH adjustment tank #3. Also transfer the untreated waste from the skimming tanks to tank #3. Agitate the total mixture, sample the pH, and make manual additions of acid or caustic to regulate the pH.

6. After it is determined that the pH is within acceptable limits, transfer the treated waste from tank #3 to tank #4 for settling. This will require installation of a new transfer pump, and should be done through a dispersion pipe or outlet box to avoid agitation of the waste water in the

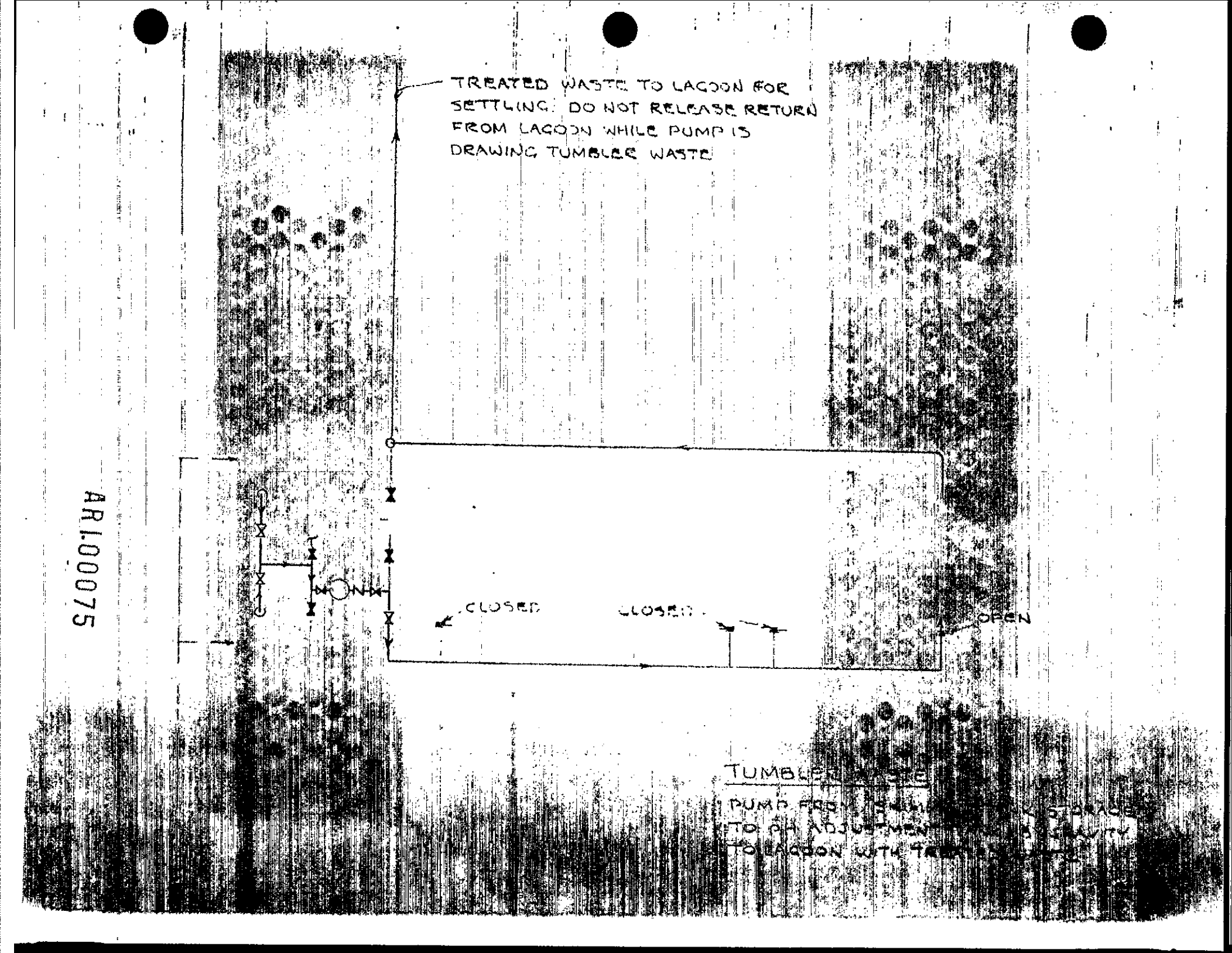
settling tank.

7. After settling as long as possible in tank #4, which will be about 8 hours during the day and 16 hours overnight, decant the clear liquid from this tank to the final settling tank, except that if the liquid is not sufficiently clarified it will be necessary to add a flocculant such as ferric sulfate.

8. The orifice formerly located at the discharge of the final settling tank should be restored so that movement of treated waste from this tank is as nearly uniform as possible over a 24 hour period. In addition the presently inoperative valve at this point should be restored so that liquid in this last tank can be retained for a longer period if necessary.

9. Since tanks #1 and #2 will be drained after each use, no sludge will be retained. However sludge will be present in #3 and #4, and shall be periodically drawn off and pumped to an outside holding tank. This tank may be of steel or concrete, and should be arranged for use with existing sludge pump. Piping will be modified to eliminate the lagoons for sludge storage, and to provide an outlet for pump discharge to a scavenger truck. Note that the Owner's responsibility is extended to make sure that the scavenger disposes of the sludge in a manner approved by the State.

10. In case of emergency, plating room wastes can be stored in the Sludge Chamber prior to treatment.


TREATED WASTE TO LAGOON FOR SETTLING. DO NOT RELEASE RETURN FROM LAGOON WHILE PUMP IS DRAWING TUMBLER WASTE
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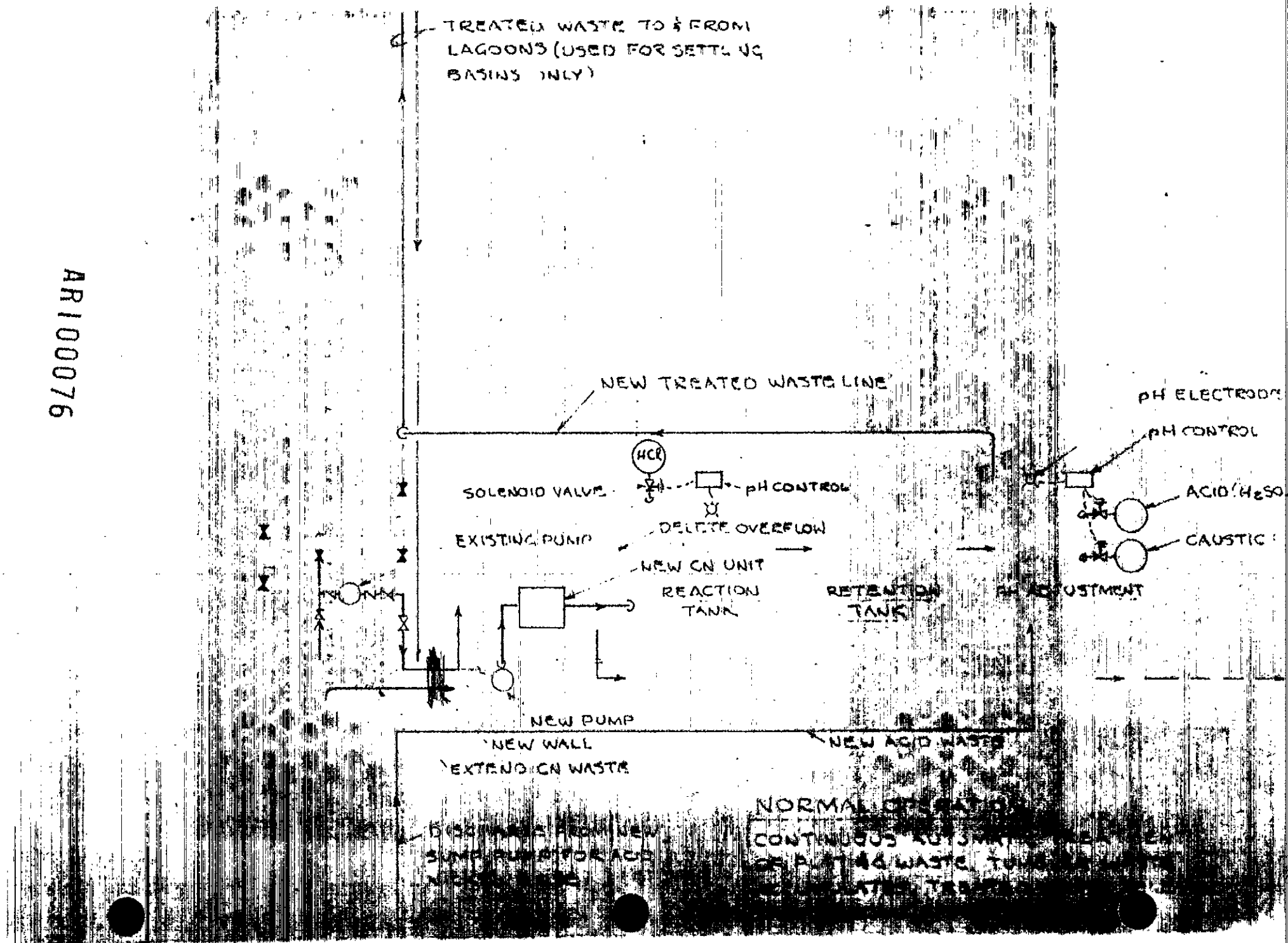
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NEW TREATED WASTE LINE
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pH CONTROL
HCl
SOLENOID VALVE
pH CONTROL
ACID (H2SO
CAUSTIC
DELETE OVERFLOW
EXISTING PUMP
NEW CN UNIT
REACTION TANK
RETENTION TANK
pH ADJUSTMENT
NEW PUMP
NEW WALL
EXTEND CN WASTE
NEW ACID WASTE
NORMAL OPERATION
CONTINUOUS